Trade Impacts on Global Deforestation: Assessing the Effects of the EUDR on Commodity Markets

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1 Abstract

The major challenge humanity faces today is how to mitigate the effects of climate change. Mechanisms aiming to reduce greenhouse gas (GHG) emissions such as multilateral agreements and carbon markets have been created to set emission targets. Among the activities responsible for generating a large volume of emissions, deforestation carries significant weight. Besides the emissions caused by forest loss, large forests play a fundamental role in controlling the planet's climate and preserving biodiversity. However, unlike the governance created to directly address emissions, multilateral agreements related to forest protection have not seen full development and adherence from countries. The European Union introduced the most advanced regulatory measures to promote the consumption of deforestation-free products. The EU Deforestation Regulation (EUDR) aims to reduce the EU's contribution to global deforestation by restricting trade with market agents operating in deforested areas—whether legally or illegally—since December 31, 2020.

However, the EU remains one of the few entities enforcing stringent regulations to combat deforestation, underscoring the need for a broader global governance framework to develop effective policies for deforestation mitigation.

Building on this, this research seeks to identify the key deforestation-intensive products and commodities, map their countries of origin, and analyze their movement through global value chains. By doing so, it seeks to estimate the potential impacts of trade restrictions on deforestation-linked products, both in international trade and in global deforestation rates. The study will simulate the effects of the EUDR through hypothetical scenarios, with a particular focus on countries with extensive rainforest coverage. This ex-ante analysis will assess the potential outcomes if the EUDR had been in force since 2005, providing insights into its long-term implications for trade and deforestation dynamics.

The data for this study comes from multiple sources to facilitate the calculation of deforestation intensity and the simulation of the EUDR's effects on

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international trade and global deforestation. The analysis is divided into three phases: Deforestation Satellite Account, Deforestation Footprint, and Trade Scenarios.

In the first phase, deforestation is quantified and linked to agricultural and livestock production at the pixel level. This is achieved using spatial raster datasets, including agricultural area (MAPSPAM), livestock distribution (GLW), and forest change (Global Forest Change).

The characterization of forest extent and its annual variations relies on Global Forest Change raster data for 2006 and 2010. These datasets, derived from Landsat imagery with a spatial resolution of 30 meters, provide detailed deforestation measurements.

To estimate the global distribution of crops per pixel—serving as the foundation for linking deforestation to agricultural production—spatial data on agricultural production and harvested area from Agro-MAPS/SPAM will be used. These datasets are compiled by FAO (Food and Agriculture Organization), IFPRI (International Food Policy Research Institute), and SAGE (Center for Sustainability and the Global Environment, University of Wisconsin-Madison). Additionally, spatial data on global livestock production and distribution (GLW), provided by FAO, will be incorporated to assess the impact of livestock expansion on deforestation.

In the second phase, I analyze how deforestation propagates through global supply chains using Input-Output analysis. This is done with the GLORIA-MRIO database, a global multi-regional input-output (MRIO) model developed by the University of Sydney. GLORIA-MRIO provides a comprehensive representation of trade and production linkages, covering 164 regions and 120 sectors, allowing for a detailed assessment of how deforestation-related commodities flow through international markets. The main goal of this phase is to build a calculator of global deforestation generated by shocks in final demand. Also, I will be able to analyze deforestation footprint by country and sector.

In the third phase, I estimate the trade scenario assuming the EUDR had been in force since 2005. To achieve this, I construct a panel dataset of exporting and importing countries by product/commodity. The primary trade data source is the bilateral trade database from the Centre d'Études Prospectives et d'Informations Internationales (CEPII). This dataset is complemented with regional yield data, which sources varies by country. Focusing on Brazil, I incorporate rural productivity and exports data by state, provided by the Brazilian Institute of Geography and Statistics (IBGE).

This panel enables a detailed mapping of exports to the EU at the HS6 product level, allowing for an assessment of the effects of total or partial trade restrictions on goods linked to deforested areas. Additionally, by integrating productivity data at the regional level, I can estimate output levels in deforested areas identified through satellite imagery.

Finally, this phase links the deforestation footprint results with the estimated trade impacts of the EUDR regulation, providing insights into how restrictions on deforestation-linked commodities might reshape global trade flows and the contribution of countries on global deforestation.

The main contribution of this work is to develop a methodology for assessing the cost-effectiveness of trade regulation scenarios, with a particular focus on the EUDR. It also explores the feasibility of implementation, the potential economic penalties for commodity-producing countries facing trade restrictions, and highlights the urgent need for global governance mechanisms to mitigate deforestation through international trade policies.